

# Excel for Teachers

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## Excel: Examples, Fun Projects and Games

In their paper “Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement” the authors (Robert J. Marzano, Debra J. Pickering, and Jane E. Pollock) identified nine strategies that have positive effects on student learning. Many of these strategies can be implemented using Excel.

1. Identifying Similarities and Differences
  - a. Use graphs to demonstrate comparisons
2. Summarizing and Note Taking
  - a. Students can take notes in Excel.
  - b. They can create outlines of chapter headings and organize them in a spreadsheet
  - c. Study guides for certain information can be effectively organized or “mapped” in Excel
3. Reinforcing Effort and Providing Recognition
  - a. Progress tracking charts are easy, visual and can be colorful and eye-catching in Excel
4. Homework and Practice
  - a. Create Excel templates that students can use to enter data for practice – they can instantly see the results when only one variable is changed.
5. Nonlinguistic Representations
  - a. Graphic organizers that can be created in Excel are limited only by your imagination. One teacher had students score the amount of “power” held by Piggie and Ralph in each chapter in the novel Lord of the Flies. They entered the numbers in a spreadsheet when they finished the book, created a line chart with a line for each character, and voila! You could see how the power of one diminished as the other increased in the book.
  - b. Descriptive, time-sequence, process, cause-effect, and other patterns can be seen using Excel features.
6. Cooperative Learning
  - a. Excel lends itself to group projects. All group members can collect data, then pool it together to create a “total picture” in one spreadsheet.
  - b. Another example: Second graders in pairs guess how many M & Ms of each color are in a packet. After they each make a prediction, they open the packages and sort by color. Data is easily converted into a bar graph and pie chart.
7. Setting Objectives and Providing Feedback
  - a. As in the “self-test” example, students can receive immediate feedback when you create an “interactive worksheet” with Excel.
8. Generating and Testing Hypotheses.
  - a. Excel helps students see the stages of decision making, data collection, testing, estimating, correcting and evaluating their final results.
9. Cues, Questions and Advance Organizers
  - a. You can use Excel to create certain “table” types of advance organizers.

### **Excel Bingo Boards and Other Online Resources**

1) Refer to this web site from Jeff and Heather Ertzberger to access the templates you will need to create the Bingo Boards:

**[http://people.uncw.edu/ertzbergerj/excel\\_games.html](http://people.uncw.edu/ertzbergerj/excel_games.html)**

- Download 3x3 or 5x5 Bingo board template. Note that this template uses a Macro, which may cause a security alert.
- In the downloaded file, you will need to enter your words in each cell in the board. Then, click the “shuffle” button, then print the card. Then, click shuffle and print another card, etc. until you have all the cards you wish.

2) Here’s an alternative Bingo Board from Jefferson County Schools in Tennessee. (<http://www.jc-schools.net>).

**[http://www.jc-schools.net/tutorials/vocab/STUDY\\_BINGO.xls](http://www.jc-schools.net/tutorials/vocab/STUDY_BINGO.xls)**

- This spreadsheet is ready to go. Download it and type in 30 vocabulary terms of your choice.
- Print the sheet to get a total of 32 different cards.
- To “play”, read your definitions and have students mark the words they find on their printed cards.

3) Interactive Excel: This site features a large number of “simulation” programs for various concepts, especially for science and math.

**[http://collaboratory.nunet.net/hou/i\\_excel/interactive\\_excel.htm](http://collaboratory.nunet.net/hou/i_excel/interactive_excel.htm)**

4) Microsoft Lesson Plans for Students and Educators

**<http://www.microsoft.com/education/lessonplans.msp>**

5) Spreadsheet Safari: This web site has several Excel activities with instructions available in Excel or PDF format. One such sheet includes many common conversions.

**<http://library.thinkquest.org/J0110054/Conversion.html>**

6) UEN Two-day Class Handouts and Resources: Download docs and web links.

**<http://www.uen.org/Lessonplan/preview.cgi?LPid=7753>**

7) How-to Article: Excelets, Excel’s Excellent Adventure

**<http://www.techlearning.com/showArticle.php?articleID=196604791>**

8) Interactive Crossword Puzzle: Use the comment feature to add clues in beginning letter cell for each word. Use color or borders to distinguish cells in which to add letters. Tutorial from Microsoft: **<http://www.microsoft.com/education/Crossword.msp>**

### **Lonely Bingo**

This exercise allows a student to play a Bingo game alone by interacting with an Excel spreadsheet. The techniques described could also be used for other interactive worksheet formats if the idea of Bingo does not appeal. This activity uses: *cell size formatting, comments and conditional formatting*.

1) Format the columns and rows so that you have a five by five game board of squares. Size the cells to accommodate your longest word(s), or format the columns to wrap text. Make the cells large enough to hold at least one word without splitting it.

2) Using the 25 questions you created, enter them as comments:

- Click on the cell in which you wish to enter a question.
- Go to the Review Tab → New Comment.
- Type your comment in the yellow “sticky” box that pops up.
- When you mouse over a cell with a comment, the box pops up.

Repeat the insert comments steps for each cell until you have entered all 25 questions.

3) Enter answer information.

- Select a cell for which to enter the answer.
- Go to the Home Tab, Styles group → Conditional Formatting.
- From the drop down menu, choose “equal to”.
- Enter the correct answer text in the field on the left.
- Choose a pre-set format or custom to set your own.

4) To Play: Provide student with a COPY of the spreadsheet file. Student floats the mouse over a cell to read the question, then types their answer in the cell. When they answer correctly, the cell color appears. They “win” by getting five cells in a row colored.

### **Other Activities**

#### **Countdown to an Important Date!**

1) Type date you are counting down to in cell A1, for example: 6/1/07

2) Type this formula in cell A2: =TODAY()

3) Type this formula in cell A3: =A1-A2

4) With cell A3 selected, go to Format → Cells, then click the Number tab. Change the number format to Number and choose 0 for decimal places.

#### **Following Directions**

Call out color and cell addresses. Students use the paint bucket to fill the cells with a color. Use the colors/cells to spell out words or designs.

#### **Mazes**

To teach students more about formatting cells, you can have them create mazes. Make the cell width the same as the cell height. Use cell borders to draw the solid lines, leaving some “open” to make the path through the Maze. Four colored cells in the center can serve as a destination.

## Create a “Self Test”

### You will need:

- Short questions, short answers
- Optional list of words for matching
- Indicator of right or wrong answer
- The “IF” function

### Layout:

- Heading with directions
- Sub-heading with optional list of words from which to choose
- OR, additional column with list of words from which to choose
- First column for question
- Second column for answer
- Third column contains “IF” function to indicate if the answer is right or wrong

### Example: Test your planetary knowledge

Enter the name of the celestial body that corresponds with each fact.

Choose from the following: Sun, Moon, Jupiter, Saturn, Pluto, Mercury, Mars, Venus

All planets rotate around me.		=IF(B3="Sun","YES","NO")
I have five moons.		=IF(B4="Jupiter","YES","NO")
I am the most recently discovered planet.		=IF(B5="Pluto","YES","NO")
I am the closest to the sun.		=IF(B6="Mercury","YES","NO")
I am a gaseous planet.		=IF(B7="Venus","YES","NO")

### Explanation:

Note the following components of the “IF” function:

- =IF( )

All formulas or functions begin with an equal sign. IF indicates the function to be performed. The parenthesis enclose the “variables” to be considered.

- B3=

This gives the cell address whose content is to be compared.

- “Sun”,

This is the value with which to compare the cell content. It must be in “quotation” marks if it is text. Note that ALL text must be in quotation marks. Also, if a student typed “sun” with a lowercase S, there would not be a match. CASE MATTERS when text is in quotation marks. The commas separates the comparison value from the next value.

- “YES”,

This is the value which is shown in the cell where you type the “IF” function, IF A3 does equal “Sun”. Again, quotation marks are necessary to indicate text. The comma separates this value from the last.

- “NO”

The final value in the function is the value which appears IF A3 does not equal the value given immediately following the equal sign.

### **Battleship Game**

To teach concepts of slope, or points on a graph, pair students with a laptop and have them create and then play a “battleship” game.

To create the battleship game, you will primarily use formatting features. Each workbook should contain two formatted worksheets – one for the player’s own ships, and one in which to mark hits on the “enemy’s” ships.

#### **Rename Sheets**

- 1) Click the Sheet1 tab at the bottom of your spreadsheet window. Right click to get the pop-up menu, then choose rename. Type the new name in the tab.
- 2) You can also double-click the sheet tab and type in the new name. Call the first sheet Enemy Ships.
- 3) Click or double click Sheet2 tab and rename Sheet2 My Ships.
- 4) Return to the “Enemy Ships” tab to begin formatting the first game board.

#### **Set up Game Board**

- 1) Adjust column width and row height to create larger, square cells.
  - a) Put your cursor over the column label A, and drag over to column J. You should have columns A – J highlighted.
  - b) With your cursor still in the grey column heading area, position it over the boundary line between two column headings. The cursor should look like a double-headed arrow. Click and drag the cursor to change the column width. As you drag, a yellow “sticky” label appears. Use that as a guide to set the width to 50 pixels (or eyeball the size). When you release from dragging, all 10 columns should be the same narrower size.
  - c) Position your cursor over the row one heading number one. Drag down until 10 rows are highlighted. With your cursor still in the grey row heading area, position it over the boundary between two of the rows so it looks like a double headed arrow. Drag the boundary down until the yellow “sticky” indicates 50 pixels (or eyeball the size).
- 2) Color the cells of the 10x10 grid and display all cell borders.
  - a) Highlight the range A1:J10. This should create a square 10 columns wide by 10 rows deep.
  - b) Using the paint bucket button in the Home Tab, Font group, choose a light blue color to fill the highlighted area.
  - c) After setting a fill color, the gridlines disappear. While the game board area is still selected, use the borders button next to the paint bucket and choose the selection for All Borders.

3) Format cell alignment so text is centered vertically and horizontally in all game board cells.

a) With the range A1:J10 still selected, under the Home Tab, Alignment group, click the button for vertical centering and the button for horizontal centering.

4) Copy game board to second worksheet My Ships.

a) With the range A1:J10 selected, choose copy. Click the tab for My Ships at the bottom of the workbook screen.

b) In the new worksheet, click the Paste button at the left end of the Home ribbon. Choose Paste Special from the menu. In the dialog box, click the radio button for Formats and then click OK.

**SAVE THE WORKSHEET.**

You may position ships, or students can enter their ships' positions. Use the following key for number and size of ships.

Number of Ships	Ship	Length	Color
1	Aircraft Carrier	6 squares	Orange
2	Battleships	5 squares	Yellow
2	Destroyers	4 squares	Light green
2	Submarines	3 squares	Grey
1	Cruiser	2 squares	Light Red

### **Color Ships**

1) Select the "squares" or cells where the ship should be located. Use the paint bucket to change the fill color of cells for ships. Note that the ships are entered only in the My Ships worksheet.

**SAVE THE WORKSHEET.**

### **Playing the Game**

1) Two students play together, and use laptops or turn the monitors so they can not see each others' screens.

2) Decide who goes first.

3) That player calls out the column and row – i.e. "C5".

4) The opponent answers hit or miss.

5) On the sheet Enemy Ships (NOT where your ships are!), the player marks an H for hit, an M for miss, or an HS for hit and sunk (or color the cells of the sunk ship black). If you get a hit, you get a second guess.

6) Now the opponent gets to call out a column and row. The player looks at the My Ships sheet and marks an H or an M, depending on if a ship is hit or not.

The first player to sink all of the opponent's ships is the winner.

## Mastermind Game

### You will need:

A four digit code, composed of numbers between 1 and 10 - fewer number choices for younger students or faster play.

### Layout:

Create a sheet that uses 9 columns. The first column should be numbered to represent the number of “tries” at breaking the code. The second – fifth columns are where students will enter their “codes”. The sixth – ninth columns are where you enter “IF” statements, and students see an “X” to indicate they have a correct number.

Use color to indicate the cells in which students will type, and use lines, borders or color over the cells where you enter the formulas to indicate if student’s number is correct.

### Example:

Students use numbers 1 – 6. My “code” is: 3, 5, 2, 1.

The first row of the game in my sheet looks like this:

A	B	C	D	E	F	G	H	I
2					=IF(B3=3,"X",")	=IF(C3=5,"X",")	=IF(D3=2,"X",")	=IF(E3=1,"X",")

- To save time, enter the formula in cell F2 first.
- Use the Fill Handle to drag the formula ACROSS G, H and I.
- EDIT the formula in each cell so that the “=value” matches your correct code.
- Select all four cells and use the fill handle to drag down as many rows as you will allow students attempts to break the code. (Using six possible digits, a student could easily break the code in 6 tries.) It is not necessary to edit the formulas after you drag them down, since the “correct” value does not change.
- For more information on the components of the IF statement, refer to the “self-test” example provided on another page.

Be sure to “protect” the sheet so that students can not see the correct code when they click on the cells. When protecting the sheet, remember to unlock the cells where students will type their guesses.

## **Standard Conversions**

Excel can be used to practice standard conversions, or to make a reference table for common conversions. In this example, use the standard formula for converting Centigrade to Fahrenheit – a tricky formula to calculate in your head. Other examples might include Miles per hour to Kilometers per hour, inches or feet to centimeters or meters, miles to feet, etc. You might also consider making a table for a common cookie recipe: if you want half as many cookies, or twice as many as the standard recipe makes, students can convert the original cups and tablespoons to make the desired amount.

This is the formula to convert Centigrade to Fahrenheit:

$$9/5 \times \text{Centigrade} + 32 = \text{Fahrenheit}$$

Using this formula, create an Excel spreadsheet that shows the Fahrenheit equivalent of all the centigrade degrees from 5-35. Think carefully how you can use the fill handle to improve your efficiency. Once designed, how fast can you create the table?

One method to try:

In column A, enter the values you wish to convert. In our example, we want equivalent Fahrenheit degrees for the range of 5 to 35 degrees Centigrade. Enter 5 in the second row, and 6 in the third row. Click the fill handle and drag until you see 35 entered in the cell.

In row two of column B, enter your formula, but substitute the cell address A2 for the actual degrees Centigrade which are already listed in column A. The formula looks like this:

$$=9/5*A2+32$$

Using the fill handle, drag the formula down column B until you reach 35 in column A.

How would you make a similar table to convert Fahrenheit to Centigrade?



### What if?

This activity is for younger students and helps them to understand planning for expenses. Select a hypothetical item students want to save money to purchase, and provide the cost of the item. Students may ask “How many weeks would it take to reach this goal?” Using a spreadsheet to answer this question, students can experiment and explore different outcomes based on these “what if” questions:

1. What if I earned \$1.80 per week?
2. What if I saved half of it each week?

After creating the sample spreadsheet below, students can change the amount earned or the amount they saved each week and measure the impact. They might also consider purchasing a less costly item. In the sample, formulas rather than values are shown where required. In the spreadsheet, formulas won’t show, only the results. Use the fill handle to copy repeating entries.

Sample:

Item Cost	Earnings per week	Portion saved per week	Dollar amount saved per week	Weeks to reach goal
				0
\$16.49	1.80	.5	=B3*C3	=E2+D3
	1.80	.5	=B4*C4	=E3+D4
	1.80	.5	=B5*C5	=E4+D5
	1.80	.5	=B6*C6	=E5+D6

When the amount in column E is equal to or greater than the item cost, students can count the number of rows to determine the number of weeks required to save. They can then save more or less of their earnings and enter the new amounts in columns B or C, or change the cost of the item in column A to see how much more or less time it would take to reach their goal.

For older students, or those familiar with Excel, you could include the count function to count the number of weeks, and you could include an additional column with If statements to automatically compare the value in column E with the amount in cell A3 to determine if the goal has been reached. Count the cells in column F where the value is “yes”, and you have an automatically generated number of weeks to reach the goal...

## **Compare Two Groups**

### **You will need:**

Two groups for which to collect data  
The same set of information for both groups  
The SUM formula  
The Chart Wizard

### **Layout:**

Enter a general title or heading.  
Create a row heading for each group.  
Create a column heading for each set of information to be compared.

### **Example: Compare expenses for boys and girls**

Who costs more each month – boys or girls?

	Hair style (1)	Snacks (1 day)	Clothing (1 outfit)	Sport/hobby (supplies)	Totals
Boys					=sum(B3:E3)
Girls					=sum(B4:E4)

Insert a column chart to compare each item and a pie chart to show which percent of the total boys consume and which percent girls consume.

### **Explanation:**

- To create a column chart -

Drag and select the first five columns for all three rows. Note that you select the column and row headings as well as the data. Excel automatically labels the data with these headings. Do not select column six because, if you included the totals in the column chart, the “range” shown in the chart would be too big.

With the “range” selected, click on the Insert Tab and choose “column chart” from the ribbon. Use the chart design buttons to customize your chart, or right click on an area of the chart to format that area.

You may move or change the size of the chart or the pieces within it by dragging the chart or the edges as you would with any other drawing object.

- To create a pie chart –

Drag and select all three rows of the first column (blank, boys, girls). Hold down the Ctrl key and drag to select all three rows of the last column (totals, number, number). From the Insert ribbon, choose a pie chart that you prefer.